

EGS CONFIDENCE TEST EXECUTION COVER SHEET

1. Test ID and Title: EOC1 - Telemetry Processing and Logging Confidence Test
2. Test Conductor / Test Lead Diane Womack
3. Planned Execution Date: 12-6-96 to 12-13-96 (Dry Run)
4. Actual Execution Date: _____
5. Planned Configuration:
 - Servers: Real-time Server, Data Server, Multicast Server
 - Data Storage Unit (File Servers, RAID Units)
 - Printers: Laser, Line, Color
 - EOC Workstations
 - FOS Telemetry Subsystem
 - FOS User Interface Subsystem
 - FOS Data Management Subsystem
 - FOS Resource Management Subsystem
6. “As Run” Configuration:
7. Package items planned for execution:

Test Case EOC1.1 steps: TBD
Test Case EOC1.2 steps: TBD
Test Case EOC1.3 steps: TBD
Test Case EOC1.4 steps: TBD
8. Package items actually executed and deviations from currently published procedures.
9. Results
 - a. Capabilities successfully demonstrated
 - b. Capabilities not successfully demonstrated
 - c. Requirements verified
 - d. Discrepancy Reports submitted

10. Lessons Learned

Telemetry Processing and Logging Confidence Test - EOC1

Background Information:

The Telemetry Processing Service provides the capabilities needed to ingest, decommutate, engineering unit (EU) convert, and limit check housekeeping (H/K), health and safety (H&S), and diagnostic/memory dump telemetry from the EOS spacecraft (S/C) subsystems and on-board instruments. **The processing of diagnostic/memory dump telemetry is covered in the EOC2, Command Processing Confidence Test.**

The telemetry data will be downlinked through a TDRSS S-band Single Access (SSA), S-band Multiple Access (MA) or Ku-band Single Access (KSA) service with a dual channel interface. During normal operations, the H/K data is recorded on the EOS AM-1 solid state recorders (SSRs) and played back during a TDRSS KSA return service at 150 Mbps (75 Mbps/75 Mbps). Recorded H/K telemetry is also played back at 256 kps using the SSA service for anomaly investigations. The real-time H/K (16 kbps) and H&S (1 kbps), and diagnostic/dump (1 kbps, 16 kbps) telemetry will be downlinked through a SSA or MA service. TDRSS ground terminals (WSGT/STGT) forward the telemetry data which is in Consultative Committee for Space Data Systems (CCSDS) packets to EDOS in Channel Access Data Unit (CADU) format via EBnet. Low-rate telemetry is forwarded directly to the EDOS Level Zero Processing Facility (LZPF). High-rate telemetry is first sent to the EDOS Ground Station Interface Facilities (GSIF) and then transferred to the LZPF at reduced rates.

EDOS receives telemetry in CADU format. It extracts the CCSDS packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID), the Virtual Channel Identifier (VCID), and the replay flag. An EDU consists of an EDOS Service Header (ESH) and a Path Service Data Unit (SDU). The ESH contains the quality and accounting data. The Path SDU is simply the Version-1 CCSDS packet. The real-time Path Service EDUs are sent to the EOC via EBnet using UDP, to specific multicast IP addresses (operational and test) and UDP ports per mission as defined in the applicable Operations Agreement (OA). The recorded EDUs are transferred in rate-buffered data files via EBnet using KFTP. The KFTP interface details such as EOC User IDs, IP addresses, host names, and file directories are defined in the applicable OA. Customer Operations Data Accounting (CODA) Report (which includes a Ground Message Header) is also sent to the EOC via EBnet using UDP. The CODA Report describes the operational activities of EDOS per S/C, this includes summaries of quality and accounting information (e.g., status of EDOS return and forward links, and VCDU service; and SCS statistics), but no information about Operations Management data is provided.

Upon receiving real-time telemetry, the Telemetry Processing Service decommutes the contents of the packets, performing the necessary EU conversions and parameter derivations. Various forms of limit checking are performed on the telemetry parameters, including boundary limit checking on analog parameters, and delta limit checking(examining the difference between successive parameter samples). For each parameter being checked

for boundary limits, the Telemetry Processing Service uses one of several limit sets, in which each limit set consists of definition for one or more upper and lower boundaries for the parameter (e.g., red high/low and yellow high/low limit sets.) All parameters, along with associated limits, quality, and event information, are made available to the operator via the FOS User Interface Service.

Eventually, the telemetry data, and related event and configuration data are sent to the FOS DMS for temporary storage. The FOS DMS maintains the data files for a user configurable number of days, then the data is sent to the Science Data Processing Segment (SDPS) for permanent archival. The data remains at the FOS DMS for minimum of seven days, but the data may be removed after seven days if confirmation of successful storage is received from the SDPS Data Server. FOS DMS also provides access to the Operational Database (ODB).

Test Objectives:

The objectives of the test are to:

- Verify that EOC can ingest and process the following types of telemetry packets from the ETS, SSIM, or AM-1 S/C at the specified data rates:
 1. Real-time instrument and S/C bus H/K telemetry (16 kbps)
 2. Real-time instrument and S/C bus H&S telemetry (1 kbps)
 3. Recorded instrument and S/C bus H/K telemetry (256 kbps, 150 Mbps [ETS HRS and AM-1 S/C only])
 4. Command/Telemetry Interface Unit (CTIU) standby telemetry (1 kbps)
- Verify that the EOC can ingest and process real-time data (e.g., two 16 kbps data streams) sent simultaneously.
- Verify that all telemetry types can be decommutated and the results displayed in soft copy and hardcopy form.
- Verify proper EU conversion, limit and alarm check processing, and derived parameter generation.
- Verify that when any critical telemetry parameter limit is exceeded, the violations are reported and any related alarm mechanisms respond properly.
- Verify proper checking of context dependency and discrete state values of telemetry parameters.
- Verify the merging of R/T and recorded telemetry to create a complete hourly file that is archived at the FOS DMS.
- Verify that the EOC can store and retrieve telemetry data from the temporary (FOS DMS) and permanent (SDPS) archive sources for reuse.

Test Configuration:

Hardware and software configurations at each ECS site are managed and tracked by the M&O organization at that site. The configuration that is tested against will be provided in the test report.

(See Exhibits EOC1-1.1, EOC1-1.2, and EOC1-1.3)

Participants and Support Requirements:

Participants:

FOT, ETS Operators, EBnet personnel, EDOS (M&O personnel), SN (TDRSS), RFSOC (M&O personnel), FDF (M&O personnel), NCC (M&O personnel), Valley Forge (M&O personnel), Western Test Range (M&O personnel)

Communications:

Voice - SCAMA and CCL circuits **TBS-1**

Data - EBnet

IP addresses: **TBS-2**

Equipment and Software:

Servers: Real-time Server, Data Server, Multicast Server

Data Storage Unit (File Servers, RAID Units)

Printers: Laser, Line, Color

EOC Workstations

FOS Telemetry Subsystem

FOS User Interface Subsystem

FOS Data Management Subsystem

FOS Resource Management System

Test Tools:

1. **ETS MPS** (S/C simulation mode) - sends telemetry in CADU format to the EDOS. **ETS MPS** (EDOS simulation mode) - sends telemetry in EDU format to the EOC (Note: This mode will be used if the ETS LRS is not available.).
2. **ETS LRS** - simulates EDOS, serving as a functional EDOS interface between the EOC and the AM-1 S/C or an AM-1 S/C simulator.
3. **ETS HRS** - provides high-rate telemetry (150 Mbps) in CADU format to EDOS or to the ETS MPS via a H/K file.
4. **SSIM** - simulates the AM-1 S/C and provides telemetry in CADU format to the ETS LRS.

Test Prerequisites:

Dynamic pages containing alphanumerics, tables, graphs, and “NODATA” and “STATIC” flag indicators (use the Display Builder); rooms (use the Room Builder); event messages (use the Quick Message Generator); and report templates (use the Report Selector: On Demand, Periodic, and Custom dialogs); tables containing predetermined telemetry parameter values to be compared with resulting decommutated and EU converted values; and ETS scenario script files.

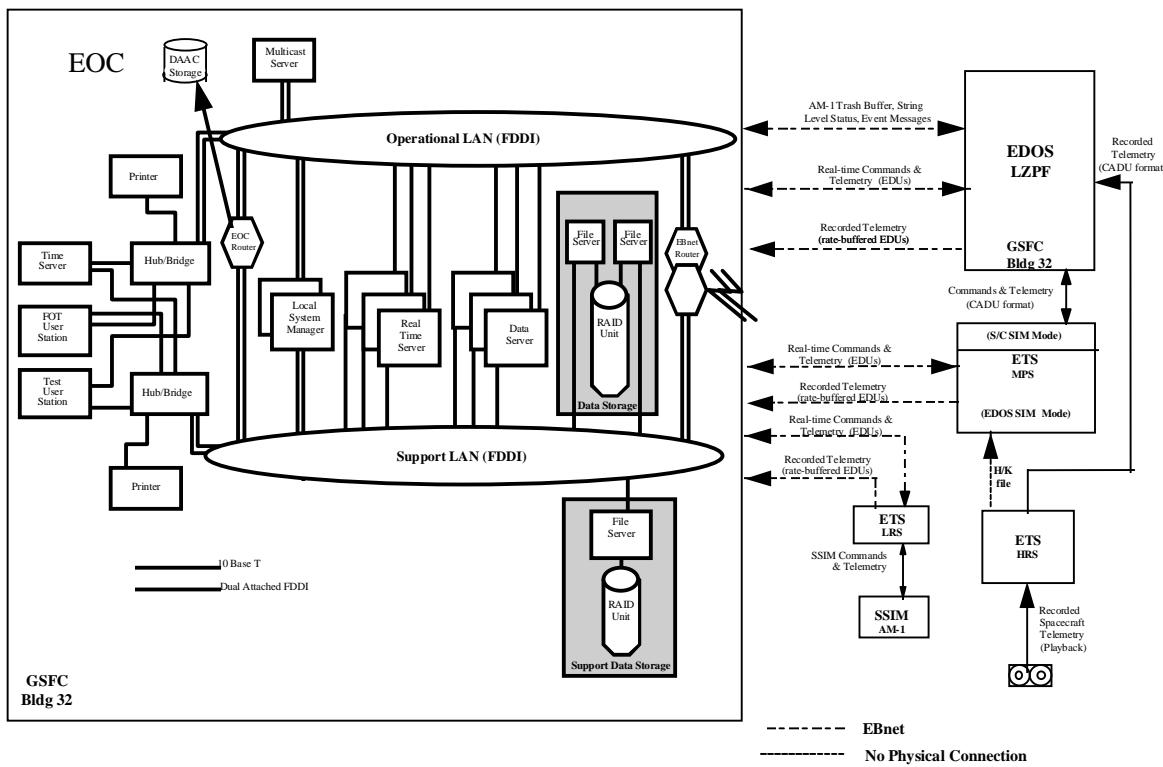


EXHIBIT EOC1-1.1: Telemetry Processing and Logging using ETS and SSIM

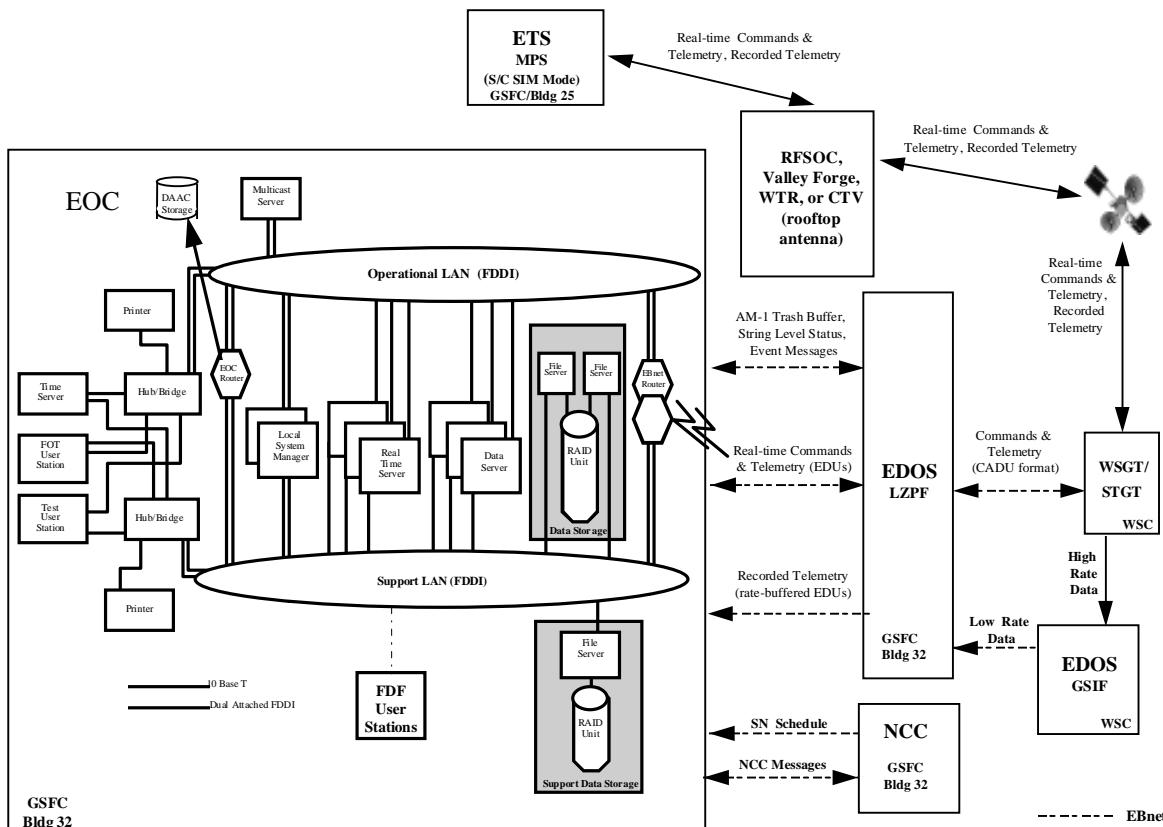


EXHIBIT EOC1-1.2: Telemetry Processing and Logging using RFSOC & ETS MPS

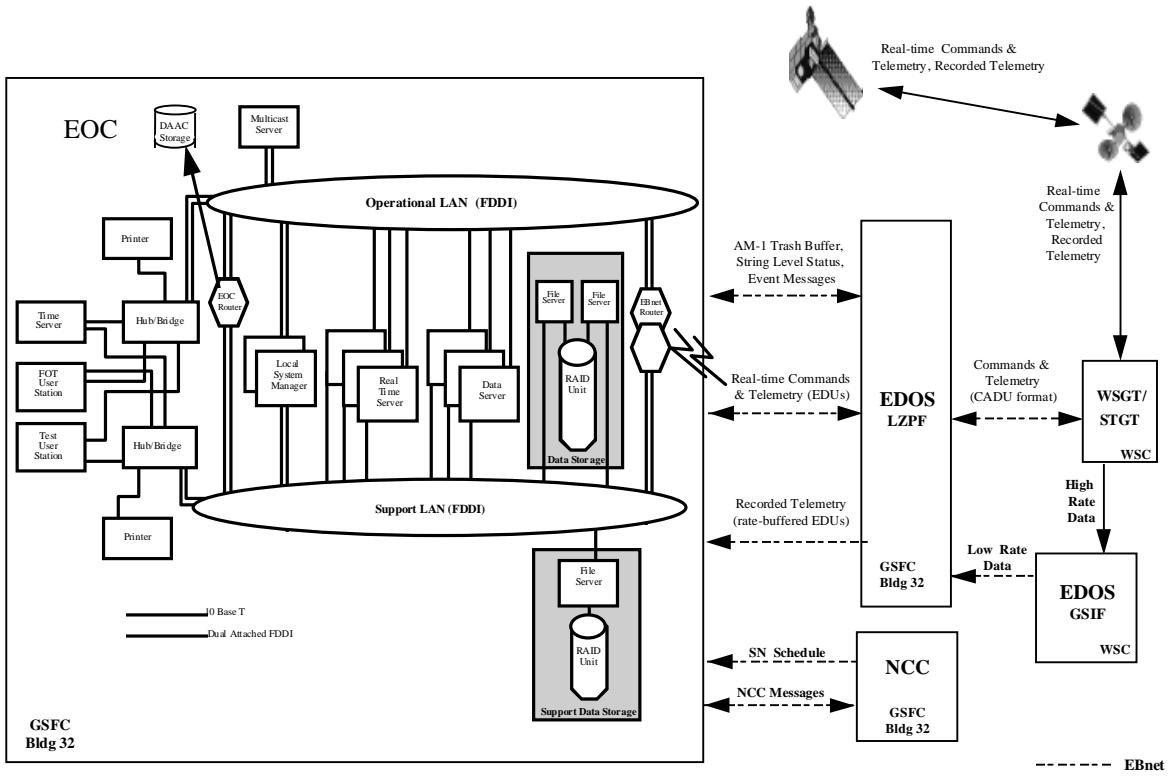


EXHIBIT EOC1-1.3: Telemetry Processing and Logging using TDRSS and AM-1 S/C

Test Data:

Will use the Telemetry Records in the PDB to assist in the definition of the telemetry parameter mnemonics associated with the required test data.

Description / Characteristics	Source	File/script name and physical location
AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters): <ul style="list-style-type: none"> S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1) 	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	rt_hk.scn
AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48; representative set of both discrete and analog parameters): <ul style="list-style-type: none"> S/C bus and instrument H&S telemetry data (1 kbps, APID = 2, VCID = 2) 	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	hs_standby.scn
CTIU standby telemetry in the form of EDUs (1 kbps [all telemetry sources except SSIM], APID = 5, VCID = 2) - one of each TLM value bit size - 1, 8, 16, 32, 48; representative set.	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	hs_standby.scn

Description / Characteristics	Source	File/script name and physical location
<p>AM-1 recorded data in CCSDS telemetry packets in the form of recorded EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48) in rate-buffered data files (each file limited to a single APID type,):</p> <ul style="list-style-type: none"> • S/C bus and instrument H/K telemetry data (256 kbps, APID = 1, VCID = 1; 150 Mbps [ETS HRS and AM-1 S/C only], APID = 1, VCID = 11) 	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	playback.scn
<p>AM-1 real-time data in CCSDS telemetry (TLM) packets in the form of Path Service EDUs (one of each TLM value bit size - 1, 8, 16, 32, 48):</p> <ul style="list-style-type: none"> • S/C bus and instrument H/K telemetry data (16 kbps, APID = 1, VCID = 1) with red & yellow high/low, and delta limit violations • S/C bus H&S telemetry data (1 kbps, APID = 2, VCID = 2) with red & yellow high/low, and delta limit violations 	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	limitchk.scn
<p>AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each telemetry sample type - current, voltage, temperature, power; one of each of the telemetry point source type - real or raw data, flight software generated data, pseudo or derived data, passive analog, and active analog; one of each possible APID/VCID combination; one of each EU conversion type - line segment [up to 15 line segments - 1, 2, 5, 8, 11, 14, 15]; polynomial [1st, 2nd, 3rd, 4th, 5th, 6th, and 7th order]); exponential.</p>	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	euconv.scn
<p>Dynamically modeled telemetry parameters.</p>	ETS	model.scn
<p>AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each possible APID/VCID combination)</p>	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	TBS-5 context.scn [Release B]
<p>AM-1 real-time data in CCSDS telemetry packets in the form of Path Service EDUs (containing at a minimum: one of each possible APID/VCID combination)</p>	ETS, SSIM, AM-1 S/C, FOS DMS, or SDPS	TBS-6 derived.scn [Release B]

Test Case Descriptions:

The initial telemetry processing tests will begin with ETS (MPS and HRS) and SSIM through the ETS LRS as the telemetry sources; later tests will be conducted using the S/C at Valley Forge (VF) and/or Western Test Range (WTR). If the S/C and the SN are not integrated, the Radio Frequency Simulation Operations Center (RFSOC) along with ETS

MPS will be used simulate the S/C. The rooftop antenna at VF is also an option. The FDF will be used to provide pointers for the rooftop antennas.

EOC1.1 Real-Time Telemetry Processing and Logging

Requirements to be Verified:

Release A: EOC-5010#A (a), EOC-5015#A, EOC-5080#A, EOC-7120#A

Release B: EOC-5010#B, EOC-5015#B, EOC-5030#B (b), EOC-5045#B,
EOC-5050#B, EOC-5080#B, EOC-5220#B, EOC-7120#B

This test verifies that the EOC can ingest and decommute real-time S/C bus and instrument health and safety EDUs, and display the resulting parameter mnemonics and values.

- EOC is configured for real-time telemetry (R/T) processing. R/T logical strings are created on R/T server(s). One of each type of connection (mirrored and tailored) is established. A set of dynamic pages with previously assigned data sources is invoked.
- EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format from the ETS MPS (S/C simulator mode) or the AM-1 S/C. The ETS LRS can also receive telemetry from the SSIM or any AM-1 S/C simulator. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. Real-time EDUs are transmitted to the EOC via EBnet using UDP, in real-time.
- EOC receives the telemetry in EDUs from EDOS or an EDOS simulator (ETS LRS or ETS MPS) and extracts the telemetry data. It decommutes the data based on the APID and telemetry decommutation information in the ODB. During decommutation, a selected set of context dependent, analog, and discrete parameters are exercised. Derived telemetry parameters are generated and exercised as well.
- The selected analog, discrete, and derived decommutated parameter values with their corresponding mnemonics are shown in telemetry display window(s). Every event that occurred during the decommutation process is shown in an event display window. A selected set of displays are printed out for review and verification of resulting telemetry values.
- Telemetry processing reports are generated. The reports are displayed on-line and printed out for review off-line.
- The R/T telemetry data is forwarded to a hourly file. This hourly file will continue to receive data for a period of one hour, then the hourly file will be archived at the FOS DMS along with related event and configuration data for temporary storage. At a user-specified time or per the request of a user, the data is forwarded to the SDPS for permanent archival. The data is maintained at the FOS DMS for a minimum of seven days.

EOC1.2 Recorded Telemetry Processing and Logging

Requirements to be Verified:

Release A: EOC-5010#A (b), EOC-7120#A

Release B: EOC-5010#B, EOC-5012#B, EOC-5050#B (b), EOC-5190#B,
EOC-5230#B, EOC-5240#B, EOC-7120#B

This test verifies that the EOC can ingest and decommute recorded S/C bus and instrument health and safety EDUs, and display the resulting parameter mnemonics and values.

- EOC is configured for recorded telemetry processing.
- EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format from the ETS (MPS or HRS) or the AM-1 S/C. The ETS LRS can also receive telemetry from the SSIM or any other AM-1 S/C simulator. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. The recorded EDUs are transferred in rate-buffered data files, along with a signal file, to the EOC via EBnet using KFTP. The signal file is used by the EDOS sending platform to inform the receiving EOC platform that a data file transfer has been completed.
- EOC receives the telemetry in EDUs and extracts the telemetry data. It merges the rate-buffered data with the R/T telemetry data to complete hourly files that are ready for archival. The data is then stored with the FOS DMS for temporary storage then next to the SDPS for permanent archival.
- The replay of rate-buffered data is invoked through a FUI replay tool. Dedicated and shared logical strings are initialized on EOC workstation(s) or R/T server(s), respectively. For the shared logical strings, one of each type of connection (mirrored and tailored) is established. Dedicated and shared replays are Release B capabilities. [24.] A set of dynamic pages with previously assigned data sources will be invoked. Selected analog, discrete, context dependent, and derived decommutated parameter values with their corresponding mnemonics are shown in display window(s). The data decommutation is based on the APID and telemetry decommutation information in the ODB. Every event that occurred during the replay request processing is shown in an event display window. A selected set of displays is printed out for review and verification of resulting telemetry values.
- Telemetry processing reports are generated. The reports are displayed on-line and printed out for review off-line.
- R/T and recorded telemetry data merge to create a complete hourly file. This hourly file is then archived at the FOS DMS along with related event and configuration data for temporary storage. **At a user-specified time or per the request of a user**, the data is forwarded to the SDPS for permanent archival. The data is maintained at the FOS DMS for a minimum of seven days.

EOC1.3 Telemetry Parameter EU Conversion, Limit and Alarm Processing

Requirements to be Verified:

Release A: EOC-5090#A, EOC-5100#A, EOC-5110#A, EOC-7120#A,
EOC-9025#A

Release B: EOC-5090#B, EOC-5100#B, EOC-5105#B, EOC-5110#B,
EOC-5120#B, EOC-7120#B, EOC-9025#B

This test verifies that telemetry parameter limits are checked during decommutation and that violations are handled properly.

- Audible alarms are enabled. EOC receives telemetry that violates red limits (high and low) specified in the ODB. The appropriate event message is displayed and related audible alarms sound off. The audible alarm is disabled. The same telemetry is resent to verify the alarm disablement feature.
- EOC receives telemetry that violates yellow limits (high and low) specified in the ODB. The appropriate event message is displayed.
- EOC receives telemetry that violates the delta limits, which are specified in the ODB, for successive samples of selected telemetry parameters. The appropriate event messages are displayed.
- Each type of EU conversion (exponential, polynomial, and linear) and limit violation (red & yellow high/low, and delta) will be exercised for a specified limit set . Limit sets or values (temporarily) will be changed and the tests will be repeated.

EOC1.4 Telemetry Dropout

Requirements to be Verified:

Release A: EOC-5070#A

Release B: EOC-5070#B

This test verifies that the EOC can appropriately mark telemetry parameters when data packets are missing or when an active R/T telemetry stream has not been received for a time period of 5 seconds.

- The ETS MPS (S/C simulation mode) sends VCDUs with dropouts to EDOS or the ETS LRS. EDOS or the ETS LRS receives telemetry in Channel Access Data Unit (CADU) format. EDOS or the ETS LRS extracts the Consultative Committee for Space Data Systems (CCSDS) packets and Command Link Control Words (CLCWs). The CCSDS telemetry packets are processed and converted to EDOS Data Units (EDUs) based on the Application Process Identifier (APID) and the Virtual Channel Identifier (VCID), and the replay flag. These EDUs are transmitted to the EOC via EBnet using UDP, in real-time. EOC receives the telemetry in EDUs from EDOS or an EDOS simulator (ETS LRS or ETS MPS) and extracts the telemetry data. It decommutes the data based on the APID and telemetry decommutation information in the ODB. The

appropriate missing packet event messages are displayed. The affected telemetry parameters are labeled “STATIC” on a previously invoked telemetry display page. The ECL DROPOUT directive will be used for the Release B testing effort.

- The ETS MPS (S/C simulation mode) sends a stream of telemetry data in CADU format to EDOS or the ETS LRS. EDOS or the ETS LRS processes this stream of data and transmits it to the EOC in the form of EDUs. This stream of data is stopped for a time period greater than 5 seconds and started back up again. When the EOC does not receive telemetry data for a time period greater than 5 seconds. The appropriate no data event messages are displayed. The affected telemetry parameters are labeled “NODATA” on a previously invoked telemetry display page.

Test procedures:
Test Set-Up:

Step	Station	Action	Expected Results	Comments
1	EOC	Initialize the FOS EOC hardware.	FOS EOC hardware: DEC RAID (no name), RAID Server (foseoc2), Data Server (foseoc7), Real-Time Server (foseoc6), and EOC User Stations (HP and Sun) are up and running.	RAID contains the users' home directories and the operational FOS software in /fos, which needs to be mounted by the other machines. [24]
2	ETS (MPS, LRS)	Initialize the ETS MPS and LRS hardware.	ETS Hardware: MPS and LRS hardware are up and running.	
3	ETS (MPS)	Bring-up the MPS Graphical User Interface (GUI).	The MPS Menu Controller appears with MPS and OMDSIM buttons.main window appears.	ETS X-terminal is TBD . This could be a laptop.
		Login to the ETS X-terminal (UNIX OS)		
4	ETS (MPS)	Type ets mps Select MPS	The MPS main window appears	
5	ETS (MPS)	Bring-up the MPS software.	The following message is shown at the bottom of the PDOS terminal: TY_main ... waiting for message	ETS PDOS terminal is TBD .
		Login to the ETS PDOS terminal		
		Change to the directory where the MPS startup script resides and type RUNACP1 .	A MPS ready message is shown in the event log window of the MPS main window.	
6	ETS (MPS)	Select S/C simulation mode for MPS.	The Spacecraft radio button is sensitized.	
		Select the Spacecraft radio button for Simulation Mode from the MPS main window.		
7	ETS (MPS)	Select the PDB as the data source for the telemetry being generated by the MPS.	The PDB radio button is sensitized.	
		Select the PDB radio button under Data Source from the MPS main window.		

Step	Station	Action	Expected Results	Comments
8	ETS (MPS)	Set the S/C and UTC times to the GMT time provided at the EOC. Select Set Time from the Control pull-down menu in MPS main window and enter the GMT time values.	The Spacecraft Time and UTC displays on the MPS main window are updated.	
9	ETS (LRS)	Bring-up the LRS software and Graphical User Interface (GUI). Login to the ETS UNIX workstation Type ets_lrs	The LRS Menu Controller window appears. The window provides access to TPCE and OMDSIM. Is the ETS MPS GUI software and LRS GUI and startup software installed on the same UNIX workstation?	ETS MPS terminal is TBD.
10	ETS (LRS)	Select the ETS LRS telemetry processing control environment (TPCE) from the LRS Menu Controller.	The TPCE monitor window appears.	TPCE monitors and controls telemetry processing environment.
11	ETS (LRS)	Select TPCE from the LRS Menu Controller. Activate the catalog which loads the configuration files for the Telemetry Backplane (TBP), Front-End Processor 1 (FEP1), Front-End Processor 2 (FEP2), and Service Processor (SV) for telemetry processing.	The status of the Activate Catalog request changes from PENDING to PASS	
12	EOC	Start the Sybase servers on the Data Server and Real-Time Server.	Sybase server #1 has started on Data Server, “foseoc7”. Sybase server #2 has started on Real-Time Server, “foseoc6”.	
13	EOC (Data Server)	Start up the FOS software for the Data Server. Login to the FOS Data Server, “foseoc7”, Type cd /fos/test/am1/scripts/setup <Return> Type A2_DataServerStartup <Return>	The appropriate FOS software processes are now running on the Data Server.	

Step	Station	Action	Expected Results	Comments
14	EOC (Real-Time Server)	Start up the FOS software for the Real-Time Server.	The appropriate FOS software processes are now running on the Real-Time Server.	
		Login to the FOS Real-Time Server, “foseoc6” Type <code>cd /fos/test/aml1/scripts/setup <Return></code> Type A2_ RealTimeServerStartup <Return>		
15	EOC (User Station)	Start up the FOS software for the User Station, “TBD-7”. Login to the EOC User Station, “TBD-7” Type <code>cd /fos/test/aml1/scripts/setup <Return></code> Type A2_ UserStationStartup <Return>	The appropriate FOS software processes are now running on the EOC User Station. ECS Flight Operations login window is displayed.	
16	EOC (User Station)	Login into the ECS Flight Operation System. Enter <login name><Return> Enter <password><Return>	Control Window and Status Window are displayed. login name is TBD-1. password is TBD-2.	
17	EOC (User Station)	Bring up the Event Display Window via the Tools Button on the Control Window.	The Event Display Window appears.	
18	EOC (User Station)	Enable telemetry data archiving. Archiving is already enabled.	An event message stating that telemetry archiving is enabled. For Release A, no event message is expected.	Release A: Archiving is already enabled. Release B: The ECL directive ARCHIVE will control the archiving modes: ARCHIVE TLM =ENABLE <tlm TYPE>
19	~	Record the system configuration on the execution cover sheet.	The “As Run” Configuration details are recorded on the execution cover sheet.	

Test Execution:

EOC1.1 Real-Time Telemetry Processing and Logging

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Create a R/T operational logical string using the ECL directive STRING CREATE.	R/T logical string is initialized. An event message confirming that the logical string [TBD-3] was successfully created is displayed in the event display on the Control Window and in the Event Display Window .	The DATABASESID defaults to the latest version of the ODB since it is not specified (e.g., DATABASESID=1.0).
2	EOC (User Station)	STRING CREATE REALTIME SPACECRAFTID=AM1 MODE=OPERATIONAL SERVER=[TBD-3]	Connect to this R/T logical string in mirrored mode. STRING CONNECT STRING=[TBD-4] CONFIG=MIRROR TLMTYPE=ALL	TBD-3 is the <real-time Server ID> (e.g., SERVER=1). TBD-4 is the <string ID> (e.g., STRING=100 or 1xx). Release A: Only mirrored connections to logical strings are supported. Release B: Both mirrored and tailored connections to logical strings will be supported.
3	EOC (User Station)	Request Ground Control privilege for the R/T logical string [TBD-4].	TAKE GROUNDCONTROL STRING=[TBD-4]	TBD-4 is the <string ID> (e.g., STRING=101 or 1xx). Ground Control privilege was granted is displayed in the event display on the Control Window and in the Event Display Window .
4	EOC (User Station)	The R/T telemetry display called <i>RT</i> , which has pre-defined data sources, is invoked at the EOC user station.	PAGE RT	The <i>RT</i> telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.
5	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both.

Step	Station	Action	Expected Results	Comments
6	ETS (LRS)	Configure the LRS to receive R/T S/C bus and instrument data as CADUs.	TBD-x.	Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
7	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (16 kbps) as CADUs. Select TLM from the Configure pull-down menu from the MPS main window. Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2. Enter a value of 16000 into the Bit Rate field for Channel 1 and 2. Click on OK .	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
8	ETS (MPS)	Set the telemetry packet configuration to HK for channels 1 and 2. Select Packet Format from the Configure pull-down menu in the MPS main window. Select the HK radio buttons for Channel 1 and Channel 2 . Click on OK .	HK radio buttons are sensitized.	An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.
9	~	Send the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.		
10	ETS (MPS)	Execute the R/T scenario script. Select Scenario from the Control pull-down menu in the MPS main window. Select an existing scenario file called rt_hk.scn . Click on OK .	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry. Release A: The scenario script,

Step	Station	Action	Expected Results	Comments
		Click on the Start push button.	Scenario dialog as they are queued for execution.	rt_hk.scn , contains both analog and discrete parameters. Release B: The scenario script will include analog, discrete, derived, and context dependent parameters.
11	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 16 kbps H/K) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing, and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
12	EOC (User Station)	Look for the first RT telemetry parameter [TBS] value change at time [TBD] and look for the last telemetry value [TBS] change at time [TBD].	The FUJ Status Window shows the telemetry transmission beginning and ending. The <i>RT</i> telemetry display is being updated as it receives the telemetry sent by the MPS and no parameter values change when the data transmission stops.	
13	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
14	~	Offline, verify that the values of the parameter mnemonics shown in the snapshot match the values specified in column 1 of Table TLM .	The values of the parameter mnemonics shown in the snapshot match.	
15	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps

Step	Station	Action	Expected Results	Comments
		Select TLM from the Configure pull-down menu from the MPS main window. Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2.		required for selecting or entering values in MPS dialog boxes; then configurations can be selected.
		Enter a value of 1000 into the Bit Rate field for channels 1 and 2. Click on OK .		The clock source may be external.
16	ETS (MPS)	Set the telemetry packet configuration to H&S for channels 1 and 2. Select Packet Format from the Configure pull-down menu in the MPS main window. Select the H&S radio buttons for Channel 1 and Channel 2 . Click on OK .	H&S radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	
17	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs to EDOS or the ETS LRS in real-time.	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog.	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry.
18	ETS (MPS)	Execute the R/T scenario script. Select Scenario from the Control pull-down menu in the MPS main window. Select an existing scenario file called hs_standby.sen . Click on OK . Click on the Start push button.	The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	Release A: The scenario script, hs_standby.sen , contains both analog and discrete parameters. Release B: The scenario script will include analog, discrete, derived, and context dependent parameters.
19	EDOS or ETS	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps H&S)	Status and event messages regarding the telemetry data reception, processing, and Version 1 CCSDS packets	EDOS Processing: The Version 1 CCSDS packets

Step	Station	Action	Expected Results	Comments
	(LRS)	as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	transmission to the EOC will be displayed.	(SDUs) are extracted from the CADUs. A EDOSService Header (ESH) is added to each SDU to create a EDU.
20	EOC (User Station)	Look for the first RT telemetry parameter [TBS] value change at time [TBD] and look for the last telemetry value [TBS] change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending. The RT telemetry display is being updated as it receives the telemetry sent by the MPS and no parameter values change when the data transmission stops.	
21	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
22	~	Off-line, verify that the values of the parameter mnemonics shown in the snapshot match the values specified in column 2 of Table TLM.	The values of the parameter mnemonics shown in the snapshot match.	
23	EOC	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	This is a Release B capability.
24	~	ADD STEPS TO ADDRESS THE VERIFICATION OF DATA ARCHIVAL, SUCH AS EXTRACTION OF DATA FROM THE FOS DMS (HISTORY LOG).		
25	EOC	Forward the telemetry data, and related event and configuration data to the FOS DMS for temporary storage.	Telemetry data, and related event and configuration data are archived at the FOS DMS.	This is a Release B capability that is provided via the ARCHIVE ECL directive.
26	EOC	Forward the telemetry data, and related event and configuration data to the SDPS for permanent	Telemetry data, and related event and configuration data are archived at the SDPS	This is a Release B capability.

Step	Station	Action	Expected Results	Comments
1	ETS (LRS)	Configure the LRS to receive recorded S/C bus and instrument data (CADUs) using the Rate Buffering Utility .	TBD-x.	
EOC 1.2 Recorded Telemetry Processing and Logging				
2	ETS (MPS)	Configure the MPS to transmit recorded S/C bus and instrument data (256 kbps) as CADUs on Channel 2. Select TLM from the Configure pull-down menu from the MPS main window. Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
3	ETS (MPS)	Enter a value of 256000 into the Bit Rate field for Channel 2. Click on OK .	HK radio button for Channel 2 is sensitized. HK radio button for Channel 1 is not sensitized.	
		Select Packet Format from the Configure pull-down menu in the MPS main window. Select the HK radio button for Channel 2. De-select the HK radio button for Channel 1.	An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	

Step	Station	Action	Expected Results	Comments
4	~	Click on OK .	Send the recorded S/C bus and instrument data (256 kbps H/K) as CADUs to EDOS or the ETS LRS in real-time.	
5	ETS (MPS)	Execute the playback scenario script. Select Scenario from the Control pull-down menu in the MPS main window. Select an existing scenario file called playback.scn . Click on OK . Click on the Start push button.	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry. Release A: The scenario script, playback.scn , contains both analog and discrete parameters. Release B: The scenario script will include analog, discrete, derived, and context dependent parameters.
6	EDOS or ETS (LRS)	EDOS or the ETS LRS receives the recorded S/C bus and instrument data (256 kbps H/K) as CADUs, processes the data to generate rate-buffered data files which contains EDUs, and sends the data to the EOC via KFTP to specific IP addresses and file directories.	Status and event messages regarding the telemetry data reception, processing, and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU. (e.g., AM1199610010.HK1) The channel value is either I or Q.
7	EOC (User Station)	Merge the data in the rate-buffered data files with R/T telemetry data to create complete hourly files that are ready for archival.	Hourly files which use the following naming convention will be created: <S/C ><SC time>.”< data type><channel>	
8	EOC (User Station)	Invoke the replay of rate-buffered data via the Analysis Request Builder . More steps for filling out an analysis request will be provided. TBS	A shared R/T logical string is established.	Release B: Maybe the Replay Controller tool will be available. Dedicated and shared replay logical strings will not be supported until Release B.
9	EOC (User Station)	Connect to this R/T logical string in mirrored mode. STRING CONNECT STRING=[TBD-x]	A mirrored connection is established. An event message confirming that the connection to the logical string [TBD-x] was successful is displayed in the event display on the Control	TBD-x is the <string ID> (e.g., STRING=100 or 1xx). Release A: Only mirrored

Step	Station	Action	Expected Results	Comments
		CONFIG=MIRROR TLMTYPE=ALL	Window and in the Event Display Window.	connections to logical strings are supported. Release B: Both mirrored and tailored connections to logical strings will be supported.
10	EOC (User Station)	The recorded telemetry display called <i>PB</i> , which has pre-defined data sources, is invoked at the EOC user station.	The <i>PB</i> telemetry display appears. The previously selected parameters (H/K) appear on the display page.	ECL directive PAGE opens page in the current room.
11	EOC (User Station)	PAGE PB Look for the first telemetry parameter [TBS] value change at time [TBD] and look for the last telemetry value [TBS] change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending. The <i>PB</i> telemetry display is being updated as it receives the telemetry sent and no parameter values change when the data transmission stops.	
12	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both.
13	~	Offline, verify that the values of the parameter mnemonics shown in the snapshot match the values specified in column 1 of Table PB .	The values of the parameter mnemonics shown in the snapshot match.	This is a Release B capability.
14	EOC	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	
15	EOC	Forward the telemetry data, and related event and configuration data to the FOS DMS for temporary storage.	Telemetry data, and related event and configuration data are archived at the FOS DMS.	This is a Release B capability that is provided via the ARCHIVE ECL directive.

Step	Station	Action	Expected Results	Comments
16	EOC	Forward the telemetry data, and related event and configuration data to the SDPS for permanent archival.	Telemetry data, and related event and configuration data are archived at the SDPS (GSFC DAAC).	This is a Release B capability.

EOC1.3 Telemetry Parameter EU Conversion, Limit and Alarm Processing

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Connect to this R/T logical string in mirrored mode. STRING CONNECT STRING=[TBD-x] CONFIG=MIRROR TLMTYPE=ALL	A mirrored connection is established. An event message confirming that the connection to the logical string [TBD-x] was successful is displayed in the event display on the Control Window and in the Event Display Window .	TBD-x is the <string ID> (e.g., STRING=100 or 1xx). Release A: Only mirrored connections to logical strings are supported. Release B: Both mirrored and tailored connections to logical strings will be supported.
2	EOC (User Station)	Request Ground Control privilege for the R/T logical string [TBD-x]. TAKE GROUNDCONTROL STRING=[TBD-x]	Ground Control privilege for string [TBD-x] is obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the Control Window and in the Event Display Window .	TBD-x is the <string ID> (e.g., STRING=101 or 1xx).
3	EOC (User Station)	The R/T telemetry display called ENCONV, which has pre-defined data sources, is invoked at the EOC user station. PAGE ENCONV	The ENCONV telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.	ECL directive PAGE opens page in the current room.
4	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a

Step	Station	Action	Expected Results	Comments
5	ETS (LRS)	Configure the LRS to receive R/T S/C bus and instrument data as CADUs.	TBD-x	printer, file, or both..
6	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (16 kbps, 1 kbps) as CADUs.	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected.
		Select TLM from the Configure pull-down menu from the MPS main window.	The clock source may be external.	
		Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2.		
		Enter a value of 16000 into the Bit Rate field for Channel 1. Enter a value of 1000 into the Bit Rate field for Channel 2.		
		Click on OK .		
7	ETS (MPS)	Set the telemetry packet configuration to H/K for Channel 1 and H&S for Channel 2.	HK radio button for Channel 1 is sensitized. H&S radio button for Channel 2 is sensitized.	
		Select Packet Format from the Configure pull-down menu in the MPS main window. Select the HK radio button for Channel 1 . Select the H&S radio button for and Channel 2 .	An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.	
		Click on OK .		
8	~	Send the R/T S/C bus and instrument data (16 kbps H/K, 1 kbps H&S) as CADUs to EDOOS or the ETS LRS in real-time.		
		Execute the R/T scenario script.	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog.	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry.
	ETS (MPS)	Select Scenario from the Control pull-down menu in the MPS main window.	The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	Release A: The scenario script, envconv.scn , contains both
		Select an existing scenario file called envconv.scn .		
		Click on OK .		
		Click on the Start push button.		

Step	Station	Action	Expected Results	Comments
10	EDOS or ETS LRS (LRS)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data ((16 kbps H/K, 1 kbps H&S) as CADUs, processes the data to generate EDUS, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	Release B: The scenario script will include analog, discrete, derived, and context dependent parameters. EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
11	EOC (User Station)	Look for the first ENCONV telemetry parameter [TBS] value change at time [TBD] and look for the last telemetry value [TBS] change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending. All the appropriate limit violation messages are displayed in the event window in the Control Window and the Event Display Window .	
12	EOC (User Station)	Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
13	~	Offline, verify that the values of the parameter mnemonics shown in the snapshot match the values specified in column 1 of Table ENCONV.	The values of the parameter mnemonics shown in the snapshot match.	

Step	Station	Action	Expected Results	Comments
14	~	Repeat steps 1-13 using the scenario script, limitchk.scn , the dynamic page called LIMIT , and the value comparison table called LIMIT .		
15	~	Repeat steps 1-13 using the scenario script, model.scn , the dynamic page called MODEL , and the value comparison table called MODEL .		
16	EOC	Generate telemetry processing reports. Display reports on-line and printed out for review off-line.	Reports are available in hardcopy and softcopy form.	This is a Release B capability.
17	~	ADD STEPS TO ADDRESS THE VERIFICATION OF DATA ARCHIVAL, SUCH AS EXTRACTION OF DATA FROM THE FOS DMS (HISTORY LOG).		
18	EOC	Forward the telemetry data, and related event and configuration data to the FOS DMS for temporary storage.	Telemetry data, and related event and configuration data are archived at the FOS DMS.	This is a Release B capability that is provided via the ARCHIVE ECL directive.
19	EOC	Forward the telemetry data, and related event and configuration data to the SDPS for permanent archival.	Telemetry data, and related event and configuration data are archived at the SDPS (GSFC DAAC).	This is a Release B capability.

EOC1.4 Telemetry Dropout

Step	Station	Action	Expected Results	Comments
1	EOC (User Station)	Connect to this R/T logical string in mirrored mode. STRING CONNECT STRING=[TBD-x] CONFIG=MIRROR TLMTYPE=ALL	A mirrored connection is established. An event message confirming that the connection to the logical string [TBD-x] was successful is displayed in the event display on the Control Window and in the Event Display Window .	TBD-x is the <string ID> (e.g., STRING=100 or 1xx). Release A: Only mirrored connections to logical strings are supported. Release B: Both mirrored and tailored connections to logical strings will be supported.
2	EOC	Request Ground Control privilege for the R/T	Ground Control privilege for string [TBD-x] is	TBD-x is the <string ID>

Step	Station	Action	Expected Results	Comments
	(User Station)	logical string [TBD-x].	obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the Control Window and in the Event Display Window .	(e.g., STRING=101 or 1xx).
3	EOC (User Station)	TAKE GROUND CONTROL STRING=[TBD-x]	The R/T telemetry display called <i>RT</i> , which has pre-defined data sources, is invoked at the EOC user station.	The <i>RT</i> telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.
4	EOC (User Station)	PAGE RT	Produce a screen snapshot.	Screen dump to a printer, file, or both. Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
5	ETS (LRS)	Configure the LRS to receive R/T S/C bus and instrument data as CADUs.	TBD-x.	
6	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs. Select TLM from the Configure pull-down menu from the MPS main window. Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2. Enter a value of 1000 into the Bit Rate field for channels 1 and 2. Click on OK .	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
7	ETS (MPS)	Set the telemetry packet configuration to H&S for channels 1 and 2. Select Packet Format from the Configure pull-	H&S radio buttons for Channel 1 and 2 are sensitized. An event message is displayed in the MPS event	

Step	Station	Action	Expected Results	Comments
		down menu in the MPS main window. Select the H&S radio buttons for Channel 1 and Channel 2 .	log window that the packet format configuration (SC Sim Mode) has been set.	
8	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs to EDOS or the ETS LRS in real-time.		
9	ETS (MPS)	Execute the R/T scenario script. Select Scenario from the Control pull-down menu in the MPS main window. Select an existing scenario file called hs_standby.sen . Click on OK .	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog. The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry.
10	EDOS or ETS (LRS)	Click on the Start push button. EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
11	EOC (User Station)	Look for the first RT telemetry parameter [TBS] value change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending.	
12	ETS (MPS)	Drop three VCDUs during the data transmission (channels 1 and 2). Select Drop TLM from the Control pull-down menu in the MPS main window. Select the following radio buttons : Channel 1 and Channel 2 . Use the No. VCDUs to drop spinner to set the	The <i>RT</i> telemetry display is being updated as it receives the telemetry sent by the MPS.	An event message is displayed in the MPS event log window that a certain number of VCDUs will be dropped during data transmission.

Step	Station	Action	Expected Results	Comments
13	EOC (User Station)	drop rate to 3 for Channel 1 and Channel 2. Look for the “STATIC” flag by each telemetry parameter mnemonic at time TBD-x in the the <i>RT</i> display window	The “STATIC” flag is by each telemetry parameter mnemonic at time TBD in the the <i>RT</i> display window	
14	EOC (User Station)	Produce a screen snapshot at time TBD-x .	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
15	EOC (User Station)	Look for the last telemetry value [TBS] change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending.	
16	~	Review the snapshot off-line.	The <i>RT</i> telemetry display shows no parameter values change when the data transmission stops. The snapshot shows a “STATIC” flag by each telemetry parameter mnemonic.	
17	EOC (User Station)	Connect to this R/T logical string in mirrored mode. STRING CONNECT STRING=[TBD-x] CONFIG=MIRROR TLMTYPE=ALL	A mirrored connection is established. An event message confirming that the connection to the logical string [TBD-x] was successful is displayed in the event display on the Control Window and in the Event Display Window .	TBD-x is the <string ID> (e.g., STRING=100 or 1xx). Release A: Only mirrored connections to logical strings are supported. Release B: Both mirrored and tailored connections to logical strings will be supported.
18	EOC (User Station)	Request Ground Control privilege for the R/T logical string [TBD-x]. TAKE GROUNDCONTROL STRING=[TBD-x]	Ground Control privilege for string [TBD-x] is obtained. An event message confirming that Ground Control privilege was granted is displayed in the event display on the Control Window and in the Event Display Window .	TBD-x is the <string ID> (e.g., STRING=101 or 1xx).

Step	Station	Action	Expected Results	Comments
19	EOC (User Station)	The R/T telemetry display called <i>RT</i> , which has pre-defined data sources, is invoked at the EOC user station.	The <i>RT</i> telemetry display appears. The previously selected parameters (H/K, H&S, and STANDBY) appear on the display page.	ECL directive PAGE opens page in the current room.
20	EOC (User Station)	PAGE RT Produce a screen snapshot.	Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a screen snapshot and send it to a printer, file, or both..
21	ETS (LRS)	Configure the LRS to receive R/T S/C bus and instrument data as CADUs.	TBD-x.	
22	ETS (MPS)	Configure the MPS to transmit S/C bus and instrument data (1 kbps) as CADUs. Select TLM from the Configure pull-down menu from the MPS main window. Select the following radio buttons : SN and Internal for Clock Source on both channels 1 and 2. Enter a value of 1000 into the Bit Rate field for channels 1 and 2. Click on OK .	An event message is displayed in the MPS event log window that the telemetry configuration for S/C Sim Mode has been set.	Make sure that a set of MPS configuration files are generated to reduce the steps required for selecting or entering values in MPS dialog boxes; then configurations can be selected. The clock source may be external.
23	ETS (MPS)	Set the telemetry packet configuration to H&S for channels 1 and 2. Select Packet Format from the Configure pull-down menu in the MPS main window. Select the H&S radio buttons for Channel 1 and Channel 2 . Click on OK .	H&S radio buttons for Channel 1 and 2 are sensitized.	An event message is displayed in the MPS event log window that the packet format configuration (S/C Sim Mode) has been set.

Step	Station	Action	Expected Results	Comments
24	~	Send the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs to EDOS or the ETS LRS in real-time.		
25	ETS (MPS)	Execute the R/T scenario script. Select Scenario from the Control pull-down menu in the MPS main window. Select an existing scenario file called hs_standby.sen . Click on OK .	The time elapsed since the scenario started is shown in the Elapsed Time field in the Scenario dialog.	A Stop push button does exist to terminate the scenario at any time; this would stop the transmission of the telemetry.
26	EDOS or ETS (LRS)	Click on the Start push button.	The simulator directives in the scenario file are displayed in the event viewing window of the Scenario dialog as they are queued for execution.	
27	EOC (User Station)	EDOS or the ETS LRS receives the R/T S/C bus and instrument data (two streams of 1 kbps H&S) as CADUs, processes the data to generate EDUs, and sends the data to the EOC via UDP to specific multicast IP addresses (operational) and UDP ports in real-time.	Status and event messages regarding the telemetry data reception, processing , and transmission to the EOC will be displayed.	EDOS Processing: The Version 1 CCSDS packets (SDUs) are extracted from the CADUs. A EDOS Service Header (ESH) is added to each SDU to create a EDU.
28	ETS (MPS)	Look for the first RT telemetry parameter [TBS] value change at time [TBD].	The FUI Status Window shows the telemetry transmission beginning and ending.	
29	EOC (User Station)	Stop the data transmission. Select the Stop Button on the Scenario window.	The RT telemetry display is being updated as it receives the telemetry sent by the MPS.	
30	EOC (User Station)	Look for the “NODATA” flag by each telemetry parameter mnemonic at time TBD-x in the the RT display window Produce a screen snapshot at time TBD-x .	An event message is displayed in the MPS event log window that data transmission has stopped.	The “NODATA” flag is by each telemetry parameter mnemonic at time TBD in the the RT display window
			Screen dump to a printer, file, or both.	Release A: Generate a UNIX script to take a screen snapshot and send it to a printer, file, or both. Release B: Use the FUI Screen Snapshot feature to take a

Step	Station	Action	Expected Results	Comments
31	~	ADD STEPS REGARDING THE RESTART OF THE SCENARIO.		screen snapshot and send it to a printer, file, or both..
32	~	Review the snapshot off-line.	The snapshot shows a “NODATA” flag by each telemetry parameter mnemonic.	

Test Termination:

Step	Station	Action	Expected Results	Comments
1	EOC	Gracefully close out all FUI Windows except for the Control Window.	All FUI windows with the exception of the Control window have disappeared.	
2	EOC	Select Quit from the File menu or Select the Close button on the dialog Close the Control Window.	The Control Window has disappeared.	
3		Type BYE on the command input line < Return >	ECS Flight Operation login window is displayed	
		Change to the directory where the FOS shutdown script resides and generate a file listing.	The file named “MyKill” is shown in the file listing.	
		Type cd /fos/test/aml/scripts/setup Type ls		
4	EOC	Execute the FOS shutdown script.	FOS applications are shutdown.	
5	EOC	Type MyKill	All process information (including the process ID number) for any FOS processes still running is displayed.	
		Check to see if all the FOS processes have been killed		
		On Sun: Type ps -ax grep fos		
		On a DEC: On a DEC:		

Step	Station	Action	Expected Results	Comments
6	EOC	Type ps -e grep fos If some FOS processes are still running, kill the remaining FOS processes. Type kill -9 <processid> for each process still running.	All FOS application processes are killed.	
		On Sun: Type ps -ax grep fos		
		On a DEC: Type ps -e grep fos		
7	EOC	Log off the EOC UNIX workstation(s).	UNIX login session ends.	
8	ETS (MPS)	Execute the MPS shutdown script. Change to the directory where the MPS shutdown script resides and type CLEAR at the PDOS terminal prompt; then type It at the same prompt.	All the MPS task processes are killed-- they no longer appear in the task process listing.	
9	ETS (MPS)	Exit the MPS main window.	The MPS main window disappears.	
10	ETS (MPS)	Logout of the ETS X-terminal used for the MPS GUI.	UNIX login session ends.	
11	ETS (LRS)	Exit the LRS monitor window.	The LRS monitor window disappears.	
12	ETS (LRS)	Close the ETS LRS Menu Controller window.	The ETS LRS Menu Controller window disappears.	
13	ETS (LRS)	Logout of the ETS UNIX workstation used by the LRS.	UNIX login session ends.	
14		Shutdown hardware.	All the FOS and ETS hardware is shutdown and powered off.	

Appendix A: Test Package Requirements Summary

Note: These testcases address either Release A, Release B, or both the Release A and B requirements to which they are mapped. Refer to each individual testcase section for requirement mapping specifics.

Requirement	Description	Test Case(s)
EOC-5010#A EOC-5010#B	The EOC shall receive from EDOS the following telemetry data types in CCSDS packets containing: a. Real-time spacecraft and instrument housekeeping data b. Spacecraft recorder housekeeping data c. SCC memory dump data	EOC1.1, EOC1.2
EOC-5012#B	The EOC shall be capable of processing spacecraft recorder data for all periods of time during which real time data was not received.	EOC1.2
EOC-5015#A EOC-5015#B	The EOC shall be capable of simultaneously receiving all EOS telemetry data types.	EOC1.1
EOC-5030#B - b	The EOC shall provide the capability to receive and process, non-telemetry data, which includes at a minimum the following: a. Messages from the NCC b. Telemetry processing status messages from EDOS	EOC1.1
EOC-5045#B	The EOC shall be capable of supporting all EOS telemetry formats for spacecraft and instrument housekeeping data.	EOC1.1
EOC-5050#B	The EOC shall provide the capability to receive and report data quality information with the incoming CCSDS packets as provided by EDOS.	EOC1.1, EOC1.2
EOC-5070#A EOC-5070#B	The EOC shall provide the capability to detect and report gaps in the telemetry data it receives.	EOC1.4
EOC-5080#A EOC-5080#B	The EOC shall provide the capability to decommute spacecraft and instrument housekeeping data.	EOC1.1
EOC-5090#A EOC-5090#B	The EOC shall perform the necessary engineering unit conversion on the decommutated housekeeping data. The EOC shall perform the necessary engineering unit conversion, derived parameter generation, and digital and discrete state determination on the decommutated housekeeping data.	EOC1.3
EOC-5100#A EOC-5100#B	The EOC shall provide the capability to perform limit checking on all non discrete parameters within the real-time telemetry, flagging all parameters that have limit violations.	EOC1.3
EOC-5105#B	The EOC shall support the definition of multiple sets of boundary limits for each non-discrete parameter, with each set including definitions for one or more upper and lower boundaries.	EOC1.3
EOC-5110#A EOC-5110#B	The EOC shall provide the capability to generate an event message whenever a predetermined number of limit violations for a parameter is detected.	EOC1.3
EOC-5120#B	The EOC shall provide the capability to accept temporary or permanent changes to limit definitions. \\1418, 1428\\	EOC1.3
EOC-5190#B	The EOC shall provide the capability to store spacecraft recorder housekeeping data as they are received from EDOS in CCSDS packets.	EOC1.2
EOC-5220#B	The EOC shall be able to process real-time data at rates up to 50 kbps per spacecraft.	EOC1.1
EOC-5230#B EOC-5240#B	The EOC shall provide the capability to receive and record spacecraft recorder data at rates up to 1.544 Mbps The EOC shall be able to process history and archived spacecraft recorder data at rates up to 150 kbps.	EOC1.2

Requirement	Description	Test Case(s)
EOC-7120#A EOC-7120#B	The EOC shall be capable of extracting data sets from the history log by specifying time and data type to include as a minimum: telemetry, command, non-telemetry messages, operator directives, events, or limits violations.	EOC1.1, EOC1.2, EOC1.3
EOC-9025#A EOC-9025#B	The EOC shall provide the capability to notify the operator of events and alarms.	EOC1.3

Appendix B: Test Scripts

ETS Scenarios

The format and content of a scenario script file follows:

```
<days>: <hrs>: <mins>:<secs>          <telemetry parameter mnemonic>, <decimal value>
<days>: <hrs>: <mins>:<secs>          <telemetry parameter mnemonic>, <decimal value>
<days>: <hrs>: <mins>:<secs>          <telemetry parameter mnemonic>, <decimal value>
```

Sample Script File:

```
000:00:01 CDH_NR_SSR1_HKRECTR, 65535
000:00:02 GNC_SR_ACEA_CSS1YERR, 255
000:00:02 COM_SR_OMN_1Z2N, 255
000:00:01 MOD_CR_PSI_ON, 1
000:00:01 AST_IR_M_MPMA_OUT, 7
```

Required Scenario Files:
 rt_hk.scn, hs_standby.scn, playback.scn, enconv.scn, limitchk.scn, model.scn,
 context.scn, derived.scn

Appendix C: Value Comparison Tables

Format is **TBD**.

Required tables: TLM, PB, ENCONV, LIMIT, MODEL